



A R K A N S A S
Department of Environmental Quality



RECOVERY.ARKANSAS.GOV
Keeping Arkansans at Work

Cover Page

- i. Project Title: American Recovery and Reinvestment Act (ARRA) Project to Reduce Diesel Emissions in Arkansas
- ii. Applicant Information:
Arkansas Department of Environmental Quality (ADEQ)
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317
Contact person: Elizabeth Sartain
Phone number: (501) 682-0719
Fax number: (501) 682-0753
E-mail address: sartain@adeq.state.ar.us
DUNS number: 809594054
- iii. Applicant Eligibility: ADEQ is Arkansas's environmental state agency with jurisdiction over air quality throughout the state.
- iv. ADEQ is requesting \$793,566 from the United States Environmental Protection Agency (EPA).
- v. The total project cost is \$904,505. The City of Little Rock and participating counties will each provide approximately \$4,158 in cost-share/leveraged resources for each piece of diesel equipment that is part of this project with the City of Little Rock contributing an additional \$11,147 for a total of \$110,939.
- vi. Project period: This project will begin when funds are awarded, but no later than September 30, 2009, and end by September 30, 2010.
- vii. Multiple projects: ADEQ will not request additional funding under this Request for Applications.

Work Plan

i. Project Summary

1. As one of the five “sectors” identified by the National Clean Diesel Campaign, the construction equipment industry can play a major role in the reduction of diesel emissions to improve the air quality. The construction industry uses more diesel engines than any other sector, and according to EPA, it generates roughly 32% of all land-based non-road oxides of nitrogen (NO_x) emissions and more than 37% of land-based particulate matter 10 micrometers or less in size (PM₁₀). Through engine upgrades and early equipment replacement, these projects will achieve a significant reduction in diesel emissions. The equipment that will be receiving engine upgrades are all pre-1996 or unregulated/Tier 0 engines. The engine upgrades will bring the equipment up to Tier 1 emission levels.
2. Engine Upgrade Groups (EUG) are EPA/California Air Resources Board (CARB) verified solutions. Upgrades can typically be done during a normal engine rebuild cycle, with new proven components to meet lower-emissions standards. These EUG solutions have been independently verified through EPA’s emissions technology verification process to reduce NO_x by 37%, particulate matter (PM) by 22%, hydrocarbons (HC) by 71% and carbon monoxide (CO) by 13%. Upgraded engines essentially meet Tier 1 emissions.
3. A top priority of Arkansas’s city and county governments is to keep thousands of miles of roadways operational and as safe as possible for Arkansas citizens. Each county and city partner owns and operates diesel powered graders, crawler tractors and/or loaders year-round, five days a week, weather permitting.

The list of committed partners for this project is as follows: The City of Little Rock and the counties of Chicot County, Clark County, Clay County, Cleburne County, Greene County, Hot Spring County, Marion County, Miller County, Mississippi County, Nevada County, Perry County, Phillips County, Randolph County, Saline County, Scott County, Stone County and Union County.

A total of 24 vehicles/equipment will be included in this project consisting of three types of vehicles/equipment. They are: graders, crawler tractors and loaders. Please see Attachment A for additional fleet information.

4. Diesel powered non-road machines have been shown to have a useful life for several decades. Their useful life is preserved through rigorous maintenance of the diesel engine. Most county and city road departments overhaul their engines every 10,000-12,000 hours of operation per manufacturer’s standards. This equates to about once every five years when operating over 2,000 hours/year. These machines all have a minimum of five years left of useful service as full production equipment and range in age from 14 to 26 years old.
5. ADEQ and our partners will sign memoranda of agreement which will outline specific responsibilities of each party. ADEQ will be responsible for seeing that the projects are completed using the appropriate technology, within the approved budget and in the accepted timeframe. ADEQ will also provide technical support to project partners. Our project partners will be responsible for completing a competitive bid process as necessary and also seeing that the project is completed within the timeframe and within the approved budget. Our project partners will also be responsible for providing approximately \$4,158 for each machine that receives an upgrade with an additional \$11,147 from the City of Little Rock.

6. Timeline

Table 1. Project timeline.

Date	Activity
November 2009	Competitive bid process begins
December 2009	Contractors will be chosen
December 2009	Equipment/kits will be ordered
Winter 2009/2010	Installation of kits
September 2010	All projects will be complete
September 2010	Final report submitted to EPA

7. Diesel powered non-road machines have been shown to have a useful life for several decades. Therefore, the significant emissions reductions will be realized well beyond the project life. Also, Tier 0 engines are typically not candidates for oxidation catalysts or particulate filter retrofits due to the high ash content of their exhaust. By targeting an older machine for an upgrade to Tier 1, 2 or 3, aftertreatment options for further emissions reductions can be considered for future projects as more EPA/CARB verified technologies become widely applicable to non-road applications.

These projects will have the important additional benefit of improving the knowledge base and skill set of county equipment managers and the diesel technicians that support them. Given the reliance of county road departments on non-road machines, developing a re-power knowledge base is key to accomplishing widespread diesel emissions reductions from existing machines. The experience gained here can be leveraged into future projects. By providing emissions upgrade experience the project will improve the feasibility and cost-effectiveness of future retrofits. In addition, the increased knowledge base and skill sets of these employees could result in increased employability should they need to find another job. Each county and the City of Little Rock will retain ownership of their equipment after the engine upgrades have been complete.

8. These projects will not be affected by the emissions reductions that are mandated under Federal, State or local law. This is because within the state of Arkansas there are currently no laws that deal with mandating diesel emissions reductions. This project is entirely voluntary and will not occur without these funds.

ii. Recovery Act Funding Priorities

1. These projects will preserve and/or create jobs and promote economic recovery. Jobs will be preserved and/or created by giving manufacturers and dealers of new equipment and engine upgrades kits additional business that would not be possible without these funds. With this increased business and income, hopefully businesses will not have to layoff employees, thereby preserving jobs. There may even be enough demand that manufactures will need to create jobs to keep up with the demand. Once the kits have been obtained, they must be installed. This will provide more demand and opportunity for job creation and/or preservation. By preserving and/or creating jobs, more people will feel more secure with their jobs and finances and will hopefully be willing to spend their money more freely on goods and services, thus promoting economic recovery. These projects will increase the demand for goods and services thus providing a positive ripple effect across the economy.

This project promotes economic recovery by providing employee training opportunities as well as preserving jobs for local skilled trade workers like mechanics, welders, service planners, shop supervisors and hauling companies.

Total Economic Recovery Analysis

For this application, ADEQ is using the formula provided by the Manufacturers of Emission Controls Association (MECA) that is being widely used. Using this formula, which builds on the study conducted by Keybridge Research regarding the macroeconomic impacts associated with DERA funding, allows for all projects to be consistently reviewed on their ability to preserve or create jobs and promote economic recovery and to maximize job creation and economic benefit, as outlined by the Request for Applications.

Total Project Cost (TPC) in millions = \$0.9

Percent of TPC for Engine Upgrade (as a decimal number) = 1

Jobs/Million = (1.0)(21.15) + (0)(14.9)

*Total Jobs Created or Preserved = (21.15)(0.9) = **19 jobs***

This project will have the important additional benefit of improving the knowledge base and skill set of county equipment managers and the diesel technicians that support them. Given the reliance of city and county road departments on non-road machines, developing a re-power knowledge base is key to accomplishing widespread diesel emissions reductions from existing machines. The experience gained here can be leveraged into future projects.

2. This project will maximize job creation and economic benefit by providing funding to create projects that would not otherwise be preserved or created. As mentioned above, new equipment and engine upgrade kits must be purchased from dealers. This will provide the dealers with additional income and demand for their products. Also, the dealers might need to hire more people to keep up the amount of orders requested. Additionally, these kits must be installed in the vehicle/equipment and that also has the potential to create more jobs. These projects will also increase demand for goods and services thus providing a positive ripple effect across the economy.
3. These projects will assist those most impacted by the current economic conditions in a couple of ways. First, these projects will preserve/create jobs in the manufacturing industry and for local skilled trade workers like mechanics, welders, service planners, shop supervisors and hauling companies. Secondly, diesel emissions can increase asthma attacks and other respiratory illnesses. This can lead to increased medical costs that not everyone can afford. By funding these projects to reduce diesel emissions, the air will be cleaner thus reducing the risk of respiratory illness and the amount of sick days an employee must take.
4. These projects will provide investments needed to increase economic efficiency by spurring technological advances in science and health by providing funds indirectly to companies that create and design the new equipment and engine upgrade kits. These projects will increase demand for these kits which will increase the pressure on companies to compete with each other to manufacture the most efficient kits possible. This will cause technological advances in science and, with the cleaner air, this will also create advances in the health of Arkansas citizens.
5. These projects will invest in transportation, environmental protection and other activities that will provide long-term economic benefits. Arkansas counties and their respective Road Departments perform the critical road/highway maintenance that is the foundation for highways and infrastructure construction. Investing in this equipment meets both goals. Reducing emissions from non-road equipment improves the regional air quality while at the same time investing in engine enhancements provides long-term economic benefits to the counties that operate that equipment.
6. Engine upgrade kits can be installed and operational within months of the grant award. After an order is placed, lead-time for parts to be received is often less than four weeks. Currently, there is excess capacity available to complete the installations as soon as the equipment owners can transport the equipment to an authorized servicing dealer. Quick turnaround under this ARRA funding also provides immediate job creation or preservation that is targeted and timely. ADEQ will commence expenditures and activities as quickly as possible consistent with prudent management. If ADEQ is a recipient of these funds, our projects will begin when funds are awarded, but no later than September 30, 2009, and all work will be completed by September 30, 2010. Also, all ARRA funds will be tracked through the Arkansas Recovery Office as a way to promote accountability and transparency of the fund expenditures.
7. ADEQ will track and measure our progress along with the City of Little Rock and the participating counties' progress towards achieving the Recovery Act priorities. All our project partners will be required to report quarterly to ADEQ, and ADEQ will be reporting to EPA as often as required which is to be determined by EPA. In addition, we will communicate with the Arkansas Recovery Office to ensure transparency in the project and expenditure of these funds. Project status will be routinely updated and communicated. This includes the progress of regional job creation or preservation.

iii. National Programmatic Priorities

1. These projects will maximize public health benefits. Engine upgrades are a cost effective way to reduce diesel emissions. Since these types of equipment are used for the public's benefit, they are used in areas where the public work and reside. We anticipate the public's exposure to diesel emissions will be reduced as a result of this project.

The equipment operates all over the state including near areas of known air quality issues, higher than average populations and sensitive receptor locations. Emissions baselines and reduction percentages were based on the EPA Diesel Emissions Quantifier (DEQ), and verification values. The emissions reductions are shown in Table 2 below.

Table 2. Emissions reductions.

	NO _x	PM	HC	CO
Percent (%) Reduced	37%	22%	71%	13%
Annual Reduction (in tons per year [tpy]for 24 Machines)	10.09	0.62	1.99	2.34

- To complete these projects, ADEQ is asking for \$793,566 in federal funds. Our partners will be providing a total match of \$110,939. An estimate of the project costs are presented in Table 3 below.

Table 3. Estimate of project costs.

Purchased Equipment/Services	Quantity	Parts Cost	Labor Cost	Total Costs
Equipment Transportation	24	\$0	\$1,100	\$26,400
Removal and Reconditioning of Radiator	24	\$0	\$3,058	\$73,392
Invoice Cost of 140G Retrofit Engine Upgrade Kit	14	\$15,589	\$0	\$218,246
Invoice Cost of 12G Retrofit Engine Upgrade Kit	10	\$20,710	\$0	\$207,100
Labor – Installation of Retrofit Engine Upgrade Kit	24	\$0	\$6,910	\$165,840
Invoice Cost of parts related to Removal and Installation of Engine	24	\$950	\$0	\$22,800
Labor – Removal and Installation of Engine	24	\$0	\$1,800	\$43,200
Quality control dynamometer test of engine (required for new labeling)	24	\$0	\$840	\$20,160
Taxes (6%)	24			\$46,628
Total				\$823,766

The Total Cost Effectiveness for all the projects combined is shown in Table 4. These projects are cost effective because these diesel equipment have a good probability of having a longer lifespan than five years. If these engines last longer than five years, then the total cost effectiveness will be greater per ton of pollutant.

Table 4. The total cost effectiveness for the entire engine upgrade project, assuming a five year lifespan.

	NO _x	PM	HC	CO
Total Cost Effectiveness (\$/ton)	\$17,929	\$291,776	\$90,905	\$77,308

- The central Arkansas area, which is the largest metropolitan area in the state and where the city of Little Rock is located, has been close to being declared nonattainment for ground level pollution under the 1997 National Ambient Air Quality Standard (NAAQS) for ground level ozone. Projects in this area would help reduce the amount of ozone-producing chemicals as well as reducing the amount of toxics being released into the air. At the beginning of 2008, the 2005-2007 design value was 83 parts per billion (ppb). At the end of 2008, the design value was 80 ppb. Given this data, EPA has projected that the ozone monitor in central Arkansas will violate the new 2008 ozone NAAQS of 75 ppb. Perry and Saline counties are also part of the Little Rock-North Little Rock-Conway Metropolitan Statistical Area (MSA) and this project will help meet attainment goals in the MSA.

In addition to the nonattainment and near nonattainment areas, there are two Federal Class I areas in the state. In Arkansas, mandatory Class I Federal areas include the Caney Creek Wilderness in Ouachita National Forest in Polk County and the Upper Buffalo Wilderness in

Additionally, two areas of the state have special air toxics concerns. Union County in southern Arkansas has a variety of chemical facilities as well as an oil refinery that contributes to air toxics concerns in the area. Additionally, Pulaski County has special air toxics concerns. North Little Rock in Pulaski County has a wood treating plant that has historically been the cause for some concern among residents.

4. Diesel emissions, especially from older equipment, result in increased PM, CO and HC in our air. Central Arkansas also has diverse sources of diesel emissions including truck traffic and truck stops associated with the intersection of Interstates 30 and 40, barge and other traffic on the Arkansas River, the Little Rock Port, the Little Rock National Airport, as well as a rail switch yard. Because the central Arkansas area has the highest population of any metropolitan area in the state, it is vital that we do all we can to prevent this unnecessary and increasing health risk.

Interstate 40 traverses the state from east to west and is a major thoroughfare for on-road diesel trucks in the state and country.

Arkansas's diesel emissions sources are summarized below in Table 5 and Table 6. Pollutants included in the tables are as follows: volatile organic compounds (VOC), NO_x, CO, PM₁₀, particulate matter of 2.5 micrometers in diameter or less (PM_{2.5}), oxides of sulfur (SO_x), and ammonia (NH₃). The totals for each column may not add up to the number shown in the totals row due to rounding.

Table 5. Arkansas 2002 annual on-road diesel emissions by category in tpy.

Category	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	SO _x	NH ₃
Light Duty Diesel Vehicle	34	66	72	12	11	4	0
Light Duty Diesel Truck	69	115	120	16	14	14	0
Heavy Duty Diesel Vehicle	2,068	40,529	10,860	1,491	1,319	1,247	70
Total	2,171	40,709	11,052	1,519	1,343	1,265	70

Table 6. Arkansas 2002 annual non-road diesel emissions by category in tpy.

Category	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	SO _x	NH ₃
Agricultural Equipment	2,282	13,785	18,649	1,875	1,725	2,019	8
Airport Ground Support Equipment	3	25	34	2	2	4	0
Commercial Equipment	1,847	1,056	39,872	109	100	115	1
Construction Equipment	1,540	8,567	13,974	875	805	1,430	6
Industrial Equipment	2,407	4,984	25,848	166	154	278	1
Railroad Maintenance Equipment	8	33	95	5	5	5	0
Locomotives	1,123	26,452	2,929	736	677	1,814	13
Commercial Marine	215	8,893	1,501	239	220	888	6
Total	9,426	63,795	102,902	4,009	3,689	6,552	36

5. Only engines that were EPA certified, and engine upgrades that are verified by the EPA or CARB, are included in this proposal. Refer to Item #2 under the Project Summary for product/engine upgrade details.
6. The engine repower and engine upgrade is expected to last until a standard overhaul, about 8,000-12,000 hours. It can be rebuilt many times thereafter to the same emissions level.
7. A Tier 1 engine essentially optimizes combustion through engine management, i.e. increased airflow, fuel injection timing, pressure and nozzle changes, increased compression of cylinder

8. Our partners currently use ultra low sulfur diesel in all of their diesel equipment including the non-road equipment included in this project.

iv. Regional Significance

This project is regional in scope due to the nature of diesel emissions. Particulate matter produced by diesel engines can travel many miles from where it was originally emitted, affecting populations near and far as well as regional haze reduction goals. In addition, the emissions reduced as part of this project will last years beyond the expiration of the assistance agreement. With the engine upgrades, we anticipate the diesel emissions to continue to be reduced for at least five years. In addition, we anticipate that when these vehicles are replaced, they will be replaced with newer equipment which meets EPA’s more stringent diesel emissions standards. These engine upgrades could result in decreased diesel fuel usage due to improved combustion. As mentioned earlier, the central Arkansas area, in particular Pulaski County, has been projected by both EPA and ADEQ to be in violation of the 2008 NAAQS for ground level ozone. The cleaner diesel technologies funded as part of this project will reduce the amount of toxic compounds emitted by diesel engines in the affected diesel fleets. The engine upgrades will ensure the amount of hydrocarbons and unburned fuel being emitted into the air is reduced.

A variety of organizations in the state have taken steps to reduce their greenhouse gas emissions. Governor Mike Beebe established the Governor’s Commission on Global Warming. The Commission represents a wide diversity of views and perspectives with members coming from business, industry, environmental groups, and academia and has published a final report containing recommendations on how greenhouse gas emissions can be reduced statewide. Metroplan, the Metropolitan Planning Organization in central Arkansas, has an established rideshare program to reduce the amount of fuel used, thus reducing the amount of greenhouse gases released into the air. City of Little Rock Mayor Stodola signed a United States Mayors Climate Protection Agreement. Those signing the agreement agree to strive to meet or beat Kyoto protocol targets, urge governments to reduce greenhouse gas emissions by 7% to 1990 levels by 2012, and urge congress to pass bipartisan greenhouse gas legislation which would establish a carbon cap and trade system.

As previously mentioned, most of this equipment in these projects are construction equipment. These upgraded engines can be used to complete infrastructure work related to ARRA funding.

v. Results – Outputs and Outcomes

ADEQ will track progress on each project by requiring quarterly reports from recipients. In addition to the quarterly reports, we will maintain communications with recipients throughout the project period to help ensure that the project will move forward in a timely fashion.

Table 7. Anticipated outputs and outcomes.

Activity	Outputs	Short, medium, and long-term Outcomes
Upgrade the engines on 24 pieces of construction equipment	24 engine upgrades on construction equipment \$904,505 Spent on this project \$712,827 Dispersed to project partners	Short-term: Successful installation of 24 engine upgrades. In the short term, the ADEQ expects increased understanding by County Judges, Fleet Managers and Operators of the environmental and economic benefits of upgrading their equipment. Short-term outcomes of this program include an increased awareness of diesel emissions and reductions associated with this project. ADEQ plans to publicize this program and promote awareness of air quality throughout the state. It is expected that this program will encourage additional partners to express interest and address emissions reductions perhaps on their own or as

	<p>Quarterly and Final reports which provide updates on vendor selection, procurement processes, the status of the overall project, the number of upgraded engines and jobs created or preserved as a result of this project.</p>	<p>part of a future funding opportunity. Medium-term: Emissions from the construction equipment upgraded will be reduced by 10.09 tons of NO_x, 0.62 tons of PM, 1.99 tons of HC, and 2.34 tons of CO for the program life of the non-road construction equipment (Assuming five years for this program). Medium-term outcomes could include the adoption of the chosen technology to other equipment in fleets. Other low or no cost emissions reduction methods could be adopted by applicants including the adoption of idling reduction, or speed reduction polices. Long-term: Cleaning up the legacy fleet will aid the State of Arkansas in its endeavor to improve the ambient air quality across the State. With the new 2008 ground-level ozone standard, the State will need to look at all avenues to reduce NO_x. Lastly, an availability of clean construction equipment speeds the adoption of newer “green” technologies within the State of Arkansas. Long-term outcomes include improvements in the ambient air quality, the reduction of health problems related to air quality and increased lung function and decreased cardiopulmonary disease in equipment operators and the communities they serve. A decrease in missed work and school days due to improved air quality would also be a long-term outcome.</p>
--	---	--

vi. Leveraged Resources and Project Partners

1. Our project partners have voluntarily committed to provide \$4,158 in matching funds per piece of equipment to be upgraded plus an additional \$11,147 from the City of Little Rock. This is just over 12% of the total project cost. Without funds from EPA, this project will not be possible.
2. Our project partners are listed as follows: The City of Little Rock and the counties of Chicot County, Clark County, Clay County, Cleburne County, Greene County, Hot Spring County, Marion County, Miller County, Mississippi County, Nevada County, Perry County, Phillips County, Randolph County, Saline County, Scott County, Stone County and Union County.

vii. Budget Detail

Personnel	Federal	Cost-share/Match	Leverage
Salaries and Wages			
Personnel	\$42,164.70	\$0	\$0
Totals	\$42,164.70	\$0	\$0
Fringe Benefits	Federal	Cost-share/Match	Leverage
31.65% of Salary and Wages	\$13,345	\$0	\$0
- Retirement, Health Benefits, FICA, SUI		\$0	\$0
Totals	\$13,345	\$0	\$0

Travel	Federal	Cost-share/Match	Leverage
Site visits to various counties within the state. 3,000 miles @ \$0.17 per mile	\$510	\$0	\$0
Totals	\$510	\$0	\$0
Equipment	Federal	Cost-share/Match	Leverage
N/A	\$0	\$0	\$0
Totals	\$0	\$0	\$0
Supplies	Federal	Cost-share/Match	Leverage
Office Supplies	\$500	\$0	\$0
Totals	\$500	\$0	\$0
Contractual	Federal	Cost-share/Match	Leverage
N/A	\$0	\$0	\$0
Totals	\$0	\$0	\$0
Other	Federal	Cost-share/Match	Leverage
Memoranda of Agreement with Project Partners for Costs Associated with Purchase and Installation of Upgrade Kits	\$712,827	\$110,939	\$0
Totals	\$712,827	\$110,939	\$0

Indirect Charges

Approved Indirect Rate: 57.44%

Base: \$42,165

Total Indirect Amount: \$24,219

viii. Applicant Fleet Description

See Attachment A.

**U. S. Environmental Protection Agency
Applicant Fleet Description Spreadsheet
2009 rev 3**



Section 1: Grant Contact Information

OrganizationName	FirstName	LastName	JobTitle	Address	City	State	EmailAddress	ZipCode	OfficePhone	OfficePhoneExt
Arkansas Department of Environmental Quality	Elizabeth	Sartain	Program Coordination Section Manager	5301 Northshore Drive	North Little Rock	AR	Sartain@adeq.state.ar.us	72118-5317	501-682-0719	N/A

Section 2: Project Information

ProjectName	Entity	TargetFleet	Number of Vehicles	City	County	State	Region	Funding Amount Requested	Additional Funding Source	Additional Funding Amount	Benefit of Public Fleet
American Recovery and Reinvestment Act (ARRA) Project to Reduce Diesel Emissions in Arkansas	City of Little Rock and the counties of Chicot, Clark, Clay, Cleburne, Greene, Hot Spring, Marion, Miller, Nevada, Perry, Phillips, Saline, Scott, Stone, Randolph, Mississippi, Union	Construction	24	City of Little Rock, Lake Village, Arkadelphia, Piggott, Heber Springs, Paragould, Malvern, Yellville, Texarkana, Prescott, Perryville, Helena, Waldron, Pocahontas, Blytheville, El Dorado, Benton, Mountain View	Chicot, Clark, Clay, Cleburne, Greene, Hot Spring, Marion, Miller, Nevada, Perry, Phillips, Pulaski, Saline, Scott, Stone, Randolph, Mississippi, Union	AR	6	\$ 793,566	Match from counties and the City of Little Rock	\$ 110,939	Yes

Section 3: Vehicle Information:

VehicleType	TargetFleet	Vehicle Class	VehicleCount	Engine Make	Engine Model	Engine Model Year	Retrofit Year	Technology	Current Fuel Type	Amount of Fuel Used	Annual Miles	Idling Hours	Horsepower	UsageRate Hours
NonRoad	Construction	Graders	2	Caterpillar	3306	1983	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	36,000	0	0	150	1800
NonRoad	Construction	Graders	1	Caterpillar	3306	1984	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	150	1800
NonRoad	Construction	Graders	1	Caterpillar	3306	1986	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	135	1800
NonRoad	Construction	Graders	1	Caterpillar	3306	1989	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	135	1800
NonRoad	Construction	Graders	1	Caterpillar	3306	1991	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	135	1800
NonRoad	Construction	Graders	1	Caterpillar	3306	1991	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	150	1800
NonRoad	Construction	Graders	3	Caterpillar	3306	1992	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	54,000	0	0	150	1800
NonRoad	Construction	Graders	2	Caterpillar	3306	1993	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	36,000	0	0	135	1800
NonRoad	Construction	Graders	1	Caterpillar	3306	1993	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	150	1800
NonRoad	Construction	Graders	2	Caterpillar	3306	1994	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	36,000	0	0	135	1800
NonRoad	Construction	Graders	2	Caterpillar	3306	1994	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	36,000	0	0	150	1800
NonRoad	Construction	Graders	4	Caterpillar	3306	1995	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	72,000	0	0	150	1800
NonRoad	Construction	Crawler Tractors	1	Caterpillar	3306	1993	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	215	1800
NonRoad	Construction	Crawler Tractors	1	Caterpillar	3306	1990	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	215	1800
NonRoad	Construction	Rubber Tire Loaders	1	Caterpillar	3306	1993	2009	EPA Verified Engine Upgrade	Diesel (ULSD), 15 ppm	18,000	0	0	220	1800